

## CLAIMS

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A method of sequestering carbon dioxide and producing natural gas comprising:
  - (a) injecting an injectant containing at least some amount of carbon dioxide into a zone containing natural gas hydrates;
  - (b) releasing natural gas from the hydrates by allowing thermal transfer and pressure changes from said injectant to the hydrates; and
  - (c) sequestering the carbon dioxide in the zone that previously contained the natural gas hydrates.
2. The method of Claim 1 wherein said injectant is a liquid.
3. The method of Claim 1 wherein said injectant is a mixture of carbon dioxide and methane.
4. A method of sequestering carbon dioxide while at the same time producing natural gas comprising:
  - (a) drilling and completing at least one well in a subterranean formation where there resides natural gas hydrates;
  - (b) supplying an injectant stream of a desired composition containing at least some carbon dioxide;
  - (c) pumping said injectant into said well to the appropriate depth and at a controlled temperature and pressure;
  - (d) circulating said injectant to said natural gas hydrates to cause dissociation of said natural gas hydrates to release free natural gas;

(e) collecting the evolved natural gas and transporting said natural gas to the surface; and

(f) allowing at least part of said carbon dioxide to be sequestered in said subterranean formation.

5. The method of Claim 4 wherein said injectant is a liquid.

6. The method of Claim 4 wherein said injectant is a mixture of carbon dioxide and methane.

7. A method of sequestering carbon dioxide while at the same time producing natural gas comprising:

(a) drilling and completing at least one well into a subterranean formation containing natural gas hydrates;

(b) supplying a gas injectant from a gas/injectant supply;

(c) continuously controlling and monitoring the gas/injectant supply to provide for the initiation, continuation, and/or shutdown of injection and production;

(d) injecting said injectant within said subterranean formation as a liquid so that heat transfer from said injectant is highly efficient, so that the pressure change and the rate of dissociation of said natural gas hydrates allows said natural gas hydrates to dissociate to free natural gas and to migrate said natural gas via gravity/density segregation to said production well, and without breaching the subsurface containment with fractures that would allow significant depressurization of the injectant so that the injectant cannot remain a liquid; and

(e) producing said hydrate-evolved natural gas that has migrated to the production well by gravity/density segregation of the hydrate-evolved natural gas from the injectant, whereby the injectant containing at least some carbon dioxide remains in said

subterranean formation where, after the final production stages, the pressure and temperature are allowed to reduce whereby said injectant changes phase to a hydrate.

8. The method of Claim 7 wherein said injectant is a mixture of carbon dioxide and methane.

9. A system for sequestering carbon dioxide and producing natural gas from subterranean natural gas hydrates by a controlled injection of an injectant stream that contains at least some carbon dioxide, comprising:

(a) a gas supply subsystem for preparation and injection of the injectant stream into a well;

(b) a well subsystem for delivering the injectant into the subsurface formation and for producing the resultant natural gas;

(c) a subsurface containment subsystem comprising a subsurface formation with static and dynamic permeability variations that form barriers to the circulation of gas and liquids; and,

(d) a monitoring and control subsystem for maintaining the production process and for controlling the injection and production pressure and temperature for the natural gas production and carbon dioxide capture and sequestration in the subsurface formation.

10. The system of Claim 9 wherein said injectant stream is a mixture of carbon dioxide and methane.